

REMARKS

Claims 1-12 and 14-18 remain before the Examiner for consideration.

1. Claims 1-12 and 14-18 were rejected under 35 U.S.C. 103(a) as unpatentable over Mizuno et al. (5,063,029) in view of Wada et al. (3,927,300). The rejection is traversed.

Claim 1 calls for a honeycomb structure containing nonmetallic, ceramic materials selected from cordierite, SiC, SiN, alumina, mullite, aluminum titanate or lithium aluminum silicate. These ceramic materials have slits formed so as to be exposed to at least part of the outer surface of the honeycomb structure along the axial direction. These recited ceramic materials do not have the thermal conductivity of metals and are not being used to conduct electricity (to function as a heater). Instead, the purpose of the slits is described on page 3, lines 8-13, of the specification thusly:

By forming the slits in this way, each portion of the honeycomb structure can deform freely without being restricted by other portion even when an uneven temperature distribution appears therein; as a result, reduction in thermal stress is possible and generation of cracks can be prevented.

In other words, by adding the slits to the ceramic honeycomb structure, both thermal stress and cracks are reduced.

Mizuno et al. '029 describes an electrically heated honeycomb made of a conductive metal and having at least two electrodes. A thin coating of a heat-resistant metal oxide is applied on the metal honeycomb structure to enhance resistance to heat, oxidation and corrosion (col. 3, lines 48-53). A resisting adjusting means (RAM) is provided on the honeycomb structure between the electrodes (col. 4, lines 65-68). The purpose of the RAM is to control the heat generation characteristics of the heater by adjusting a resistance of the structure. The catalytic converter aspect can be heated locally or in its entirety depending on the converter's application (col. 3, lines 22-30). The RAM may be a slit or slits of any length, formed in any direction at any position (col. 5, lines 1-5).

Fig. 2, copied below, is discussed in Example 3 of the reference.

Fig - 2

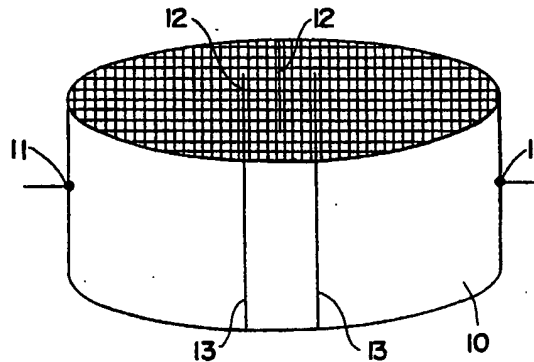


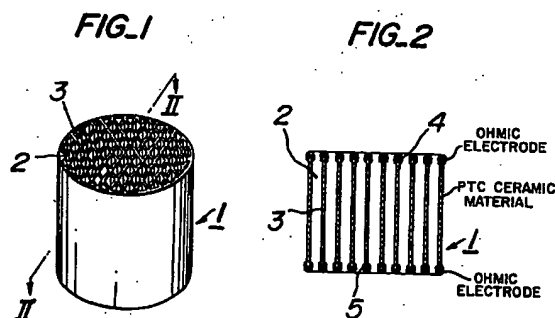
Fig. 2 has three slits 12, which are separated by small intervals of 4.55 mm. As described at the end of Example 1, a zirconia-type heat-resistant inorganic adhesive was filled in an outer peripheral portion 13 of each slit to form an insulating portion. The electrodes are shown as 11. These slits are not free-standing and available for independent movement to relieve stress. Instead, the adhesive structurally binds the sections together, albeit electrically insulating one from another.

Mizuno et al. '029 with its metallic honeycomb structure does not relate to adding slits to a ceramic honeycomb to reduce thermal stress and cracks. Thus the patent is not a proper primary reference in this case.

The Examiner contends that Wada et al. '300 teach a ceramic heater made of SiC, citing col. 1, lines 40-45. That passage is

in the "Description of the Prior Art" and it is a very brief description of a silicon carbide ceramic heater with problems. Wada et al. '300 proposes to use a material with a positive temperature coefficient (PTC); see col. 1, lines 9-10. In the Description of the Prior Art, Wada et al. '300 state in col. 1, lines 37-49, that the ceramic article, for example silicon carbide, has been used for heaters, but the article has "a negative temperature coefficient" and such heating elements are "not suitable for use with domestic heaters." Thus Wada et al. '300 is teaching away from using silicon carbide because it has a negative temperature coefficient.

The article preferred and patented by Wada et al. '300 is illustrated in Figs. 1 and 2 copied below.



The overall heating element 1 is made of partition walls 3 that form a honeycomb structure. A pair of ohmic electrodes 4 and 5

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are attached on the opposite ends of the walls to apply current to heat the structure. Again, Wada et al. '300 does not relate to adding slits to a ceramic honeycomb to reduce thermal stress and cracks.

The Examiner contends that it would have been obvious to modify the honeycomb structure of Mizuno et al. '029 and use a silicon carbide in order to generate a given amount of heat; the Prior Art portion of Wada et al. '300 is cited in support of this contention.

These two references relate to completely different subject matter and there is no proper reason why an artisan would want to replace the metallic, electrically conductive heating element of Mizuno et al. '029 with the insulator type ceramic material briefly discussed in Wada et al. '300, especially when Wada et al. '300 says that the ceramic material does not make for a good heater.

MPEP 2143.01 entitled "Suggestion or Motivation To Modify the References" states in the third paragraph:

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for

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an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Here Mizuno et al. '029 relates to an electrically conductive metallic heater that is divided into insulated segments by a resistive adjusting mechanism. There is no suggestion in Mizuno et al. '029 to make such a change as radical as replacing these critical conductive metal honeycomb elements with an insulating material.

MPEP 2143.01 has a further section stating the following:

FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH *PRIMA FACIE* OBVIOUSNESS

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

Here there is no teaching of the desirability of removing the conductive metal honeycomb elements from Mizuno et al. '029.

A later part of MPEP 2141.01 reads:

THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE

If proposed modification would render the prior art invention being modified unsatisfactory for its intended

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purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)

Applying that concept to the present case, if the conductive metallic honeycomb elements were removed and replaced with an nonconductive ceramic of the Wada et al. '300 type, the heater performance would be significantly decreased. Thus there is no proper suggestion in the art to eliminate the electrical conductive metallic element of Mizuno et al. '029 as the Examiner suggests.

As pointed out in the last Amendment regarding Abe et al. '697, there is a significant difference between a ceramic honeycomb and a metal honeycomb - the low heat conduction of the ceramic v. the ready heat conductivity of the metal. This low heat conduction is a property completely different from the property displayed by a metal honeycomb because metals conduct electricity and have very good thermal conductivity. Thus there is no proper suggestion to substitute the metal conductor in Mizuno et al. '029 used for electrically heating the exhaust gas with the ceramic material of Wada et al. '300, which does not have that required electrical conductivity. Such a substitution would render the Mizuno et al. '029 device unable to carry out its intended purpose; the rejection

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is improper. Accordingly, review and withdrawal of this rejection are requested.

Applicants respectfully submit that the present application is now in condition for allowance. Accordingly, the Examiner is requested to issue a Notice of Allowance for all pending claims.

Should the Examiner deem that any further action by the applicants would be desirable for placing this application in even better condition for issue, the Examiner is requested to telephone applicants' undersigned representative at the number listed below.

Respectfully submitted,

PARKHURST & WENDEL, L.L.P.


Charles A. Wendel

Registration No. 24,453


Date

Attorney Docket No.: WATK:213

PARKHURST & WENDEL, L.L.P.
1421 Prince Street
Suite 210
Alexandria, Virginia 22314-2805
Telephone: (703) 739-0220

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